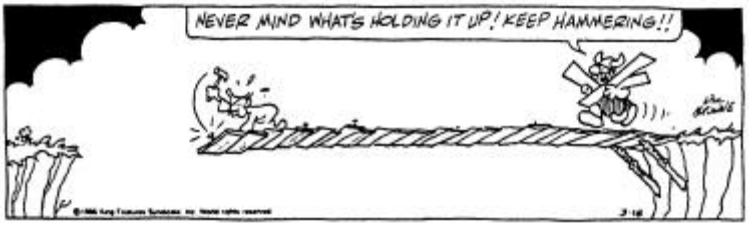
The goals of a successful construction project are to build a quality facility on schedule while minimizing claims and change orders. The project is not over when design is complete. The same care and effort exercised during earlier stages is required during the construction phase and on into initial occupancy.

A well-managed design phase is the most direct route to a well-constructed building. However, even projects managed properly during design will encounter problems during construction. You've probably heard of claims and change orders. The mere mention of them is always accompanied by a shudder. This chapter looks at why claims arise and how to minimize them. It also walks you through change orders, how to analyze and negotiate them, as well as how to process and track them.

Keeping a construction project on schedule is as essential as attempting to stay on budget (and comply with court orders). This chapter also explores scheduling options and keys to good performance. Finally, high quality designs and drawings mean nothing if your project isn't built to the prescribed standards. Assuring this quality is carried into construction is another management function.

The following documentation provides insight into minimizing the problems and understanding and coping with the process.



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BIDDING STRATEGIES

The following strategies cannot be ranked from best to worst. They all have advantages and disadvantages. What's appropriate for you will depend on your project and your needs.

You should have selected your during the PS phase and followed it throughout.

Lump Sum General Contract

The construction contract is awarded to one contractor based on a low bid fee.

Advantages:

Single point responsibility. Single contract.

No expenses are committed until the entire contract is awarded, assuring an affordable contract or re-design if necessary, prior to the award of a single dollar.

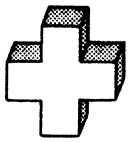
Caution - Improperly planned projects involving lump sum general contracting could produce the following results:

This is the slowest option. Construction does not begin until all of the drawings are complete.

Although no construction expenses are committed until the entire facility is designed, none of the actual costs are known until most of your time and money for design have been spent. If the bids come in high now, you may have to go back three steps.

Prepurchase

The owner contracts directly with material and equipment manufacturers for long lead items. These items generally include security equipment, security doors and hardware, security hollow metal, security control panels, large mechanical and electrical equipment, specialty items, etc. These materials and equipment can be purchased as fabricated and delivered with installation by the manufacturer or fabricated and delivered with installation by the general contractor.



Advantages:

Schedule efficiencies. Contractor does not have to wait for long lead items.

Contractor mark-up is saved on prepurchase items.

Direct working relationship with manufacturers of items that are critical to the facility's completion.

Caution - Improperly planned projects involving prepurchase could produce the following results:

Owner assumes responsibility for delivery of items which may require warehousing.

Owner Furnished Equipment/Material

Owner-furnished equipment and material is often used interchangeably with prepurchase. However, it differs from prepurchase in that schedule is not the motivating factor. As a matter of fact, materials and/or equipment may be purchased after the general contract has been let. One reason for owner-furnished equipment is bulk purchase. An item may be required throughout a county's building program, such as toilet accessories, WAC units, etc. Therefore, for cost considerations (savings on bulk purchasing) and standardization, the owner may opt to purchase as owner-furnished.

Advantages:

Contractor mark-up is saved.

Caution - Improperly planned projects involving owner-furnished equipment and material could produce the following results:

Owner assumes responsibility for delivery of items which may require warehousing if they arrive early or claims for delays if they arrive late.

Division of responsibility - when problems arise, who's responsible if it was installed by someone other than the manufacturer? Clarify who will install equipment, this will vary from job to job. Clarify warranty periods.

Coordination between owner and contractor responsibilities can be a problem if not clearly defined.

Phased Construction

Construction contracts are awarded at different times in order to accelerate the construction schedule. Contracts

are based on completed design packages which are not related or are loosely related such as a site grading package, site utility package, or different buildings bid separately.

Advantages:

Design can be focused on individual pieces instead of the whole project.

If parts of the project have different critical end dates, phased construction will accommodate this. For example, if bed space is required as soon as possible, support spaces can be built afterward or later without slowing down the process.

Construction schedule is accelerated.

Caution - Improperly planned projects involving phased construction could produce the following results:

Minor increase in architect fees for producing additional bid packages.

Multiple building packages can result in unique building materials and systems in each building. This makes maintenance difficult and spare parts inventory excessive. However, this can be avoided by proper use of prepurchase and/or owner supply of items such as doors, hardware, toilets, etc., which you want to be consistent.

Coordination of multiple packages in the field is more difficult.

Fast Track

Fast Track is similar to phased construction in that multiple contracts are let at different times. However, fast track differs because bid packages are closely related. An example of fast track bid packages are foundations, precast, finishes, structural steel, interior partitions, interior finishes, etc. It's important to keep in mind that fast track bidding is not necessarily a means of saving money, but rather a means of saving time. Fast tracking is most likely to save money in times of high inflation. The reverse also can be true, and fast-tracking too fast can cost more.

Advantages:

The quickest approach to achieving a completed project, fast track starts construction earlier and mandates that design decisions for each subsequent

phase be made in a timely fashion. Often when you don't have immediate pressure to make decisions during design, the issues hang on much longer than necessary. Once a fast track project starts, it demands a momentum which is difficult to stop.

Caution - Improperly planned projects involving fast tracking could produce the following results:

Minimizing design flexibility. For example, relocating a wall becomes expensive once a foundation has been installed.

Increases chances of change orders and claims. Special attention and staffing in the field are a must if you are to maintain coordination and communications.

Trade Contracting

Multiple construction contracts are let to what would normally be considered subcontractors. Examples of contracts are concrete, masonry, steel, WAC, electrical, etc.

Advantages:

General contractor mark-up is eliminated on subcontractor work since the individual subcontractors are contracting directly with the owner. If done property, this is the least expensive way to build a facility.

Owner has direct link to contractor actually performing the work in lieu of working through a second-party contractor.

Increases the ability for a local contractor to compete in smaller towns.

Improved quality and pride of work has been observed when trade contracting is used. This may be attributed to a subcontractor being his own boss, working directly for the owner. Local pride is enhanced by local contractors.

Trade contracting may be used as an option to a general contract bid that resulted in a poor response.

One bad subcontractor is not as likely to hurt a project as compared to a bad general contractor.

Caution - Improperly planned projects involving trade contracting could produce the following results:

Most of the disadvantages associated with trade contracting can be eliminated/minimized if the job is well managed. Instead of one general contractor to manage, you must keep track of as many as 15 to 30 subcontractors. Documents need to be clearly defined; bid packages need to encompass the entire package without duplicating or letting items slip through the cracks. Packages need to be defined so that systems have single point responsibility. For example, if the roof leaks, there should be only one responsible party.

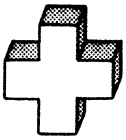
NOTE: Trade contracting may be phased, fast tracked and bid simultaneously.

Multiple Prime

More than one contract is awarded for the project. Phased construction, fast track, trade contracting and even prepurchase are considered multiple prime strategies.

Design/Build Guaranteed Max

This contract strategy awards one contract to an architect/contractor to design and build a project for a fixed fee.



Advantages:

Owner assured of a project at a fixed cost.

Caution - Improperly planned projects involving design/build could produce the following results:

This option offers the least owner participation and control.

Owner gets a project at a fixed cost but not necessarily the desired project. If the owner requests anything outside that listed in the contract document, it is added to the project. For example, if the owner wants a certain type of valve, this would be an add.

This approach may be difficult or impossible with a public project.

Negotiated Contract

Some counties in California can contract for jail construction work through negotiated contracts. This process involves issuing Requests For Proposals (RFPs), developing short lists, and negotiating prices with those contractors short-listed. This process allows contractors to offer alternative solutions to construction parameters in an attempt to make their proposals more appealing. In order to negotiate contracts for construction the county board of

supervisors must declare a local emergency and receive a minimum of three qualified proposals.

CLAIMS MANAGEMENT

Remember, if you pay for something through a change order, you have probably paid more than you would have through the bidding process - sometimes up to twice as much. All of the following tips require having an experienced staff representing your interest in the field.

Most counties have their own contractual language/terminology for handling change orders, but procedures generally followed to process them are as follows:

Claims may be made by either the owner or contractor based on changes that occur outside of the basic contract documents. Claims are based on cost, time or damages. A definition of claims may be found in the American Institute of Architects' General Conditions of the Contract (A201-1987-7.4). (See Section VI, References.)

> "Should either party to the contract suffer injury or damage to person or property because of any act or omission of that other party or of any of his employees, agents or others for whose acts he is legally liable, claim shall be made in writing to such other party within a reasonable time after the first observance of such injury or damage."

Claims are generally resolved by clarification or change orders. In extreme cases arbitration or court litigation may be required.

Contractor claims, also referred to as "Request for Change Orders," result for four reasons: concealed condition/causes beyond the contractors control; design deficiencies; user and owner request for additional/change of scope; or coordination of multiple contractors. Each of these reasons for claims are described below.

Concealed Conditions/ Causes Beyond Contractor's Control

These are the only types of claims that technically should occur on a well-managed project. They arise most frequently on renovation projects - those that have the most unknowns. Since these claims generally are unanticipated, they are difficult to control. However, there are ways to minimize them. AIAs General Conditions of the Contract (A201-1987-12.2.1) describes these claims as:

"…should concealed conditions encountered in the performance of the work below the surface of the ground or concealed or unknown conditions in an existing structure be at variance with the conditions indicated by the contract documents, or should unknown physical conditions below the surface of the ground or should concealed or unknown conditions in an existing structure of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this contract..."

Concealed Conditions In The Site

The best way to minimize concealed conditions in the site is through comprehensive testing and accurate surveying. If soil conditions are a potential problem, it is preferable to incorporate a linear foot price in the bid document for deep foundations. This cost would be used as a basis to pay the contractor for any additional piles that had to be drilled, instead of allowing him to quote a potentially higher price when submitting a change order. Unit pricing may be used in other applications as well, such as cost per cubic yard of rock, etc. This way the contractor bids on a known quantity and establishes a price at bid time for any additional work.

Concealed Conditions in the Building

Concealed conditions in the building result from the unknowns of renovation work. These claims often arise as a result of poor "as-built" drawings, if any are available. If true for your project, make sure the architect performs a thorough walk-through and documents existing conditions in the bid documents.

You will pay more for the work if the contractor is uncertain of existing conditions when he bids the work. You also will pay more to finish the job if the existing documents are inaccurate. For example, when a wall designated to be removed turns out to be a supporting wall for other parts of the building, you're put in a situation where the design may be compromised by a workable solution. You will have an unforeseen cost in your budget, and you will probably pay more for that work as a change order than if it had been properly documented originally.

Other Conditions Beyond Contractor Control

Additional items which result in claims are described in AIA's General Conditions of the Contract 14th edition, (A201-1987- 8.3.1) as:

> "... labor disputes, fire, unusual delay in transportation, adverse weather conditions not reasonably anticipatable, unavoidable casualties, or any causes beyond the contractor's control..."

Weather and other time delays beyond the contractors' control are impossible to manage. However, the contract

documents should contain a reference to the number on non-work days to be expected as normal. This may be a set number or a reference to the National Weather Service's typical amount of rain days exceeding so many inches per day in the project's location.

Design Deficiencies

Claims of this nature are merely a barometer gauging the quality of the construction documents. These claims generally arise from contractor misinterpretation, design conflict or omitted items. in all cases, the contractor will generate what is known as an "Information Request" (IR) or "Request for Information" (RFI). If the architect needs to implement a change, a "bulletin" (also referred to as a "Request for Change") will be generated.

Contractor Clarifications. RFIs do not necessarily mean that the scope of the contract will change. Many RFIs simply require clarification from the architect. Before agreeing to a claim, make sure the change is not covered in the plans, specifications or addendums.

If a request for clarification results in an answer to the contractor which does not increase the scope of work (it doesn't cost you any money), it is a "field order." Make sure your team is staying on top of answering requests for clarifications.

If a potential problem is clarified before other work is installed which would have to be corrected, the solution does not cost you any money. if questions go unanswered and work is installed which does have to be changed, the change will cost you money. Also, if your team does not answer the contractor in a timely manner and the project is delayed, the contractor has just cause for a claim because his time on the job is prolonged, increasing his overhead costs. You may end up paying for him to work overtime at the end of the project to finish on time.

The best way to keep what should be a clarification from growing into a scope increase is by maintaining the continuity of your team from design through construction. When new players are added during construction, they don't have the front-end team's working knowledge of the design.

Design Conflict and Omissions. When a conflict or omission in the drawings or specifications results in additional work for the contractor, a "change order" must be issued which directs the contractor to a solution. This increases the cost of the contract. (See

the following section on change order processing for further discussion.)

Consider building a cell/room mock-up prior to construction. A $100 mistake made in an isolated area is not as critical as a $100 mistake made on 500 cells. This $50,000 problem can be avoided by building an exact replica of a cell during the early design phase. This $5,000 to $10,000 investment will help establish critical dimensions, generate lighting and heating data, build your confidence in the design and perhaps save you considerable money in change orders.

Additional/Change of Scope

Construction is the worst time to make a change in scope. Generally, you will get roughly 50 to 75 cents value on every dollar for change order work. If the change requires moving walls or other major revisions, then the change will produce even worse returns. On average, change orders on new projects cost 2 to 3 percent of the total project budget. Remodeling and phased projects, however, experience change orders of up to 10 percent.

If change orders are becoming a problem early in the project, the use of an independent claims management consultant may be prudent to offset future lawsuits. The consultant can thoroughly document problems as the project progresses. Trying to sort out problems later only gives contractors the advantage.

If changes in scope or additional scope are crucial to the success of a project, they must be implemented. Because the facility may be operated for more than 40 years, making sure it is functional and safe is paramount.

Additional scope may be desired if you have funds left due to a good competitive bidding. A better way to handle this, however, is by using additive alternates. Additive alternates should be included in the bid documents, ensuring competitive bids on all work in lieu of a negotiated change.

Additive Alternates. Use of additive alternates is one of the steps involved in determining wants versus needs during the design phase. Since there is no certainty that funds for additive alternates will be available, these items must be considered "wants." Alternates may include an additional housing unit, square footage above and beyond the programmed space, landscaping, upgrade in materials, etc. Alternatives should be clear in that minimal additional design is required and bid preparation for them by

contractors is easily performed. The number of alternates should be limited to approximately six, These are generally identified during the schematic and design development phases.

If you have not followed the bidding and claims advice presented up to this point in this Handbook, you should plan to hire a claims consultant at the start of construction.

Coordination Of Multiple Contractors

Finally, claims also result from multiple contracts, owner-furnished items and owner labor. When damages are caused by destruction of completed work or schedule delays due to lack of coordination, the party who was damaged will receive compensation.

When the owner takes on the responsibility of multiple contracts, it is best that a CPM schedule be utilized. A CPM schedule, short for Critical Path Method, is a means of networking activities together to determine the impact one task (such as a delay in the delivery of doors) has on the remaining schedule. This tool is permissible evidence in a court of law. (See Schedule Control for further explanation.)

CHANGE ORDER PROCESSING

AIA's glossary of construction terms describes change orders as:

> "A written order to the contractor signed by the owner and the architect, issued after the execution of the contract, authorizing a change in the work or an adjustment in the contract sum or the contract time. The contract sum and the contract time may be changed only by change order. A change order signed by the contractor indicates the contractor's agreement therewith, including the adjustment in the contract sum or the contract time." (Refer to AIA's General Conditions of the Contract (A201-1987). See Section VI, References.)

Prior to a claim becoming a change order, it must first be analyzed and negotiated. It is important to analyze and negotiate a cost rebate as well as an expense. A cost control report should be issued prior to approval of c change order so you'll know its impact on the overall budget. Pending change orders should be carefully tracked in your cost control report so that all of the seemingly small ones don't all of a sudden add up to a big surprise when they come due.

Once a claim has been acknowledged as a change above and beyond the scope of the contract documents, a price needs to be negotiated. If there is a difference of opinion as to whether the claim is indeed additional scope or if a price cannot be agreed upon, then arbitration or court litigation may be required as a last resort. **Your contract should give you the capability to order the contractor to proceed with the work if a price cannot be agreed upon. The difference of opinion will be settled afterward. Remember, do not let the contractor pressure you with delays in negating change orders.**

Change Order Evaluation Steps

The following are helpful in evaluating change orders.

Make sure that the change is not covered in the plans, the specifications or the addenda.

Verify the contractor's estimate. The contractor is obligated by the contract documents to submit a proposed cost for the change. This cost generally is submitted for materials and labor. The contract document should state a fixed percentage for mark-up for both subcontractor and contractor work.

Verify quantities and materials.

Use previous estimates and requests for payment to determine costs.

Contact suppliers or use other sources in order to determine cost.

Negotiate costs and time extensions (if applicable) with the contractor. The goal of negotiation is to be fair and equitable while maintaining a positive working relationship. You aren't striving to beat the contractor down to save a few dollars. You are entrusting the contractor with millions of dollars for a facility that will run for many years. It doesn't pay to irritate him for a few dollars.

Try to negotiate the change order prior to the work being completed. This leads to the best price. However, if a price cannot be reached and the change order impacts the schedule, it may be necessary to begin work prior to resolution.

Consider the option of correcting items after construction, using maintenance crews in order to avoid the up to 50 cents on the dollar change order price. Is the change a "must have" or a "like to have"?

Determine if the cost exceeds your individual change order limit or your total change order limit.

Finally, obtain proper approvals.

SCHEDULE CONTROL

Keeping in mind that schedules in contracts vary from those used as management tools, the best way to keep a project on schedule is through careful on-site monitoring. You need a baseline to monitor. The baseline may be milestone dates, barcharts, or network diagrams. These reports are discussed below.

TYPES OF SCHEDULES

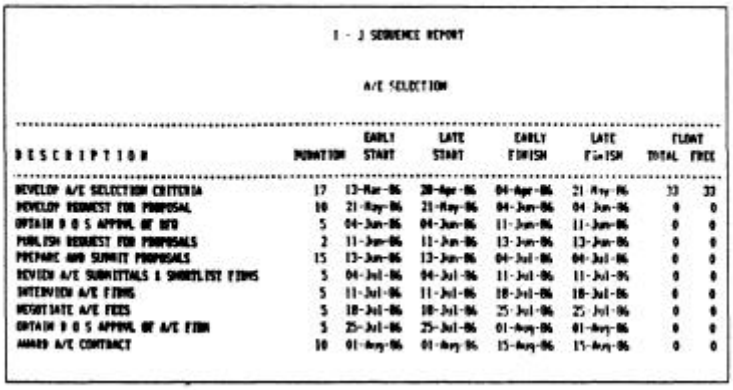
There are several ways of displaying a schedule, depending on the information and the level of detail to be communicated.

Once a scheduler has defined all the activities relevant to his project and the relationships of these activities to each other (i.e., the logic and sequence of activities), a critical path or critical activities are determined by a series of computations which can be done either manually or by computer. The calculations include determining the earliest and latest possible start and finish dates for each activity and the permissible lag (or float) between the completion of one activity and the start of a subsequent activity.

This output can be presented in one or more of the following reports: Activity Status Report, Milestone Report, Barchart and Network Plot.

Activity Status Report

The Activity Status Report is a listing of all activities with their start and finish dates. This report includes some or all of the following: original and actual start and finish dates, original and actual duration, and percent completion and accountability (i.e., which person or group has the primary responsibility for the task).



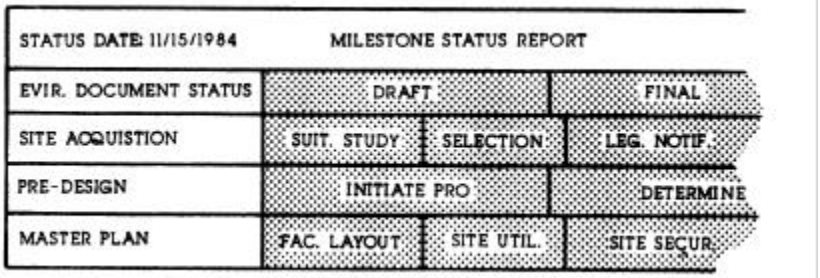
I - J SEQUENCE REPORT

A/E SELECTION

DESCRIPTION	DURATION	EARLY START	LATE START	EARLY FINISH	LATE FINISH	FLOAT TOTAL	FLOAT FREE
DEVELOP A/E SELECTION CRITERIA	17	13-Mar-86	28-Apr-86	04-Apr-86	21 May-86	33	33
DEVELOP REQUEST FOR PROPOSAL	10	21-May-86	21-May-86	04-Jun-86	04 Jun-86	0	0
OBTAIN D O S APPROVAL OF RFP	5	04-Jun-86	04-Jun-86	11-Jun-86	11-Jun-86	0	0
PUBLISH REQUEST FOR PROPOSALS	2	11-Jun-86	11-Jun-86	13-Jun-86	13-Jun-86	0	0
PREPARE AND SUBMIT PROPOSALS	15	13-Jun-86	13-Jun-86	04-Jul-86	04-Jul-86	0	0
REVIEW A/E SUBMITTALS & SHORTLIST FIRMS	5	04-Jul-86	04-Jul-86	11-Jul-86	11-Jul-86	0	0
INTERVIEW A/E FIRMS	5	11-Jul-86	11-Jul-86	18-Jul-86	18-Jul-86	0	0
NEGOTIATE A/E FEES	5	18-Jul-86	18-Jul-86	25-Jul-86	25 Jul-86	0	0
OBTAIN D O S APPROVAL OF A/E FIRM	5	25-Jul-86	25-Jul-86	01-Aug-86	01-Aug-86	0	0
AWARD A/E CONTRACT	10	01-Aug-86	01-Aug-86	15-Aug-86	15-Aug-86	0	0

Milestone Report

The Milestone Report is a selection key of milestone activities. This is a summary level of the Activity Status Report and provides the end user with a concise report of key dates. For instance, a Milestone Report might summarize the start and end dates of each contract within a multiple contract project, such as sitework, foundations, structural steel, etc.

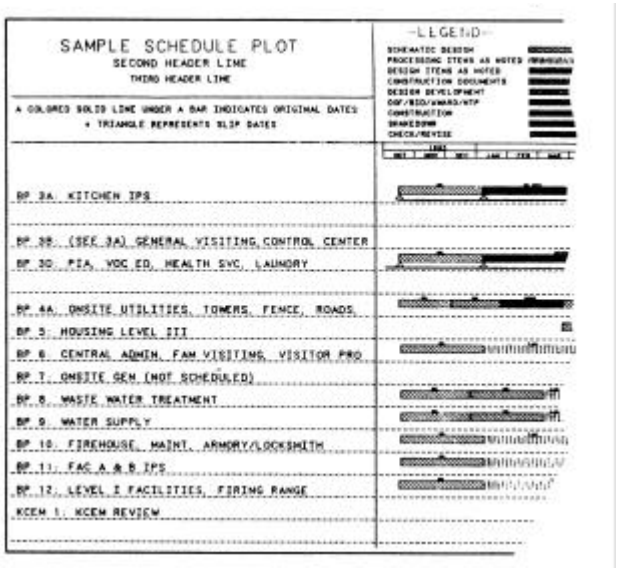


STATUS DATE: 11/15/1984 MILESTONE STATUS REPORT

ENVIR. DOCUMENT STATUS	DRAFT		FINAL
SITE ACQUISTION	SUIT. STUDY	SELECTION	LEG. NOTIF.
PRE-DESIGN	INITIATE PRO		DETERMINE
MASTER PLAN	FAC. LAYOUT	SITE UTIL.	SITE SECUR.

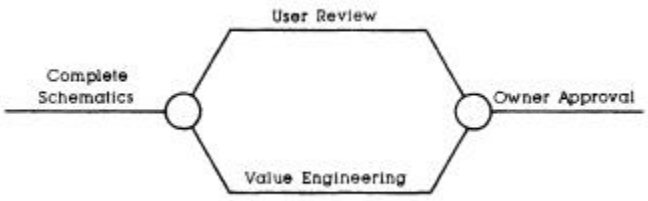
Barchart

The Barchart, generally referred to as a Gantt barchart, is a graphic depiction of the schedule. This chart may display two bars - one that depicts the original (target) schedule and the other the current (actual) schedule. The Barchart can consist of any number of activities, depending on the level of detail the user wishes to convey. The user can also group activities together on the chart, For example, he may want to divide the barchart up by contract.



Network Plots

Networks are another graphic method of displaying the schedule. The Network Plot actually shows the logical relationship between activities. The plot is time-scaled and activities are drawn as straight lines. Their start and finish points, referred to as nodes, are connected to other activities, as defined by the scheduler when the project schedule was initially developed. For instance, if the schedule was set up with the following sequence of events: completion of schematic drawings, followed by review by the user and value engineering by the project manager, followed by approval from the owner, the network would show two lines originating from the finish node of the activity "complete schematic drawings." One of these lines would be the activity "user review." The other would be "value engineering by PM." Both of these lines would then connect to the activity "obtain owner approval."



This form of displaying the schedule allows the user to see all of the constraints in his schedule and the impact of changing any activity. In the above example, it is evident that owner approval cannot take place until both user review and value engineering are complete. If value

engineering is delayed two weeks, owner approval will be delayed as a consequence.

The importance of a Critical Path Method (CPM) schedule is that if an activity is delayed, the impact of that delay can be determined on the rest of the schedule, since activities have been networked together.

Schedules To Include In Contract Documents

Include either milestone dates or a simple barchart in the contract documents. To get any more definitive than that would be restrictive for the contractor since there are many approaches to constructing a building. The contract should require the contractor to submit a detailed schedule based on the milestone dates you have identified in the bid documents. Once the contract has been awarded, the contractor will submit his own schedule. Check this schedule for compliance with the dates established in the bid documents. **Carefully review your approved schedule for its cost and liability to the county.**

Schedules To Use

If the project is a single contract, the contractors schedule may be sufficient. Depending upon the complexity of the job, you may want your staff to maintain a schedule against which they can check the contractors. If the project involves multiple contracts, it then becomes essential to have one of your representatives maintain a schedule that combines and interrelates all schedules into one master.

From the moment a schedule update first reflects that your project is behind, take action. Your representative and the contractor should devise a plan of corrective action to bring the project back on schedule. Once behind schedule, projects have a tendency to drift. The longer it takes to develop a corrective plan, the larger the problem will become. If it becomes a problem, correcting it will more than likely cost you directly or indirectly.

If a corrective plan cannot be reached and the contractor is unwilling to exert an effort to bring the project within schedule, you have several options.

First, expedite the job daily. Document number and trades of workers and progress in daily reports. Work on a corrective plan with the contractor. Evaluate pay requests, making sure that the only work paid for is work completed. Pay requests should be tied to the schedule so that each working activity has a dollar value.

If this does not resolve the problem, use the written word, such as a telegram, to express the need to accelerate the schedule.

As a last resort, initiate a seven-day notice for "Failure to Perform." Generally County Counsel will prepare this document, and the Board of Supervisors will approve it. Different counties may have different processes. A copy of this letter will be sent to the contractors bonding company, making it difficult for the contractor to get bonded on future jobs. This action, if pursued further, could result in the removal of the contractor. **Keep in mind that the object is to maintain a positive working relationship with the contractor. Removing the contractor is messy business. It should be noted that the contractor has no incentive to be on the job any longer than necessary. Overhead is costing him money every day.**

Use Of Liquidated Damages

Another tool you can use to encourage on-schedule performance is liquidated damages. These damages are an incentive to complete the project on time. They are assessed for each calendar day that the job comes in over budget. You include this in the bid documents.

There are, however, drawbacks to liquidated damages if they're not used property. First, liquidated damages cost you money. The contractor is likely to increase his bid if liquidated damages are included. Second, if other jobs are being bid simultaneously, contractors may prefer to bid on jobs without liquidated damages. Third, if a project has a tight schedule, the contractor may assume the project will take an extra 30 days and incorporate that cost into his bid. Therefore, if a $1,000-per-day assessment is implemented, the contractor may increase his bid by $30,000. Finally, in a court of law, liquidated damages will only be awarded if you can prove damages have been experienced equal to the value assessed to the contractor. For example, this would be satisfied if you are mandated by the courts to pay a daily fee for not having the new facility occupied.

Use Of Positive Incentives

Another incentive used in contract documents for on-schedule performance is a reduction in the contractor's retainage. Generally, a 10 percent retainage is withheld from the work completed in order to protect the owner. This retainage costs the contractor interest.

A positive incentive may be applied to withhold only 5 percent for each on-schedule month, Lower retainage also may be used in conjunction with liquidated damages. In other cases, bonuses for on-schedule performance have

been used. Once again, each county will have different policies as to what can and cannot be done.

QUALITY ASSURANCE

Projects are built below standard because the plans and specifications are inferior or the construction fails to comply with them. Full-time field supervision is required at all times. Having an architects representative on-site is not free, but you may want to pay for this service. Others who supervise for quality include construction managers and county inspectors. Additionally, user group representatives, including custody and maintenance staff, should walk through the building and focus on operational concerns.

Before starting construction, the construction management team should establish a relationship with contractors that welcomes contractor proposals for alternative methods of construction that can result in negative change orders. Substitutions and alternate methods should be approved by the architect and the County to ensure modifications are compatible with the desired quality level and that delays will not adversely affect other parts of the design. Be aware that these types of changes can increase the architect's fee if not provided for when the architect's contract is negotiated. Contractor suggestions are most efficiently handled before construction documents are fully completed.

When work does not meet the requirements of the plans and specifications, all similar work should be halted immediately. The completed substandard work should be removed and replaced until it is installed properly, By demonstrating to the contractor that inferior work will not be tolerated and that it costs him more to do it that way, the quality of future work will improve.

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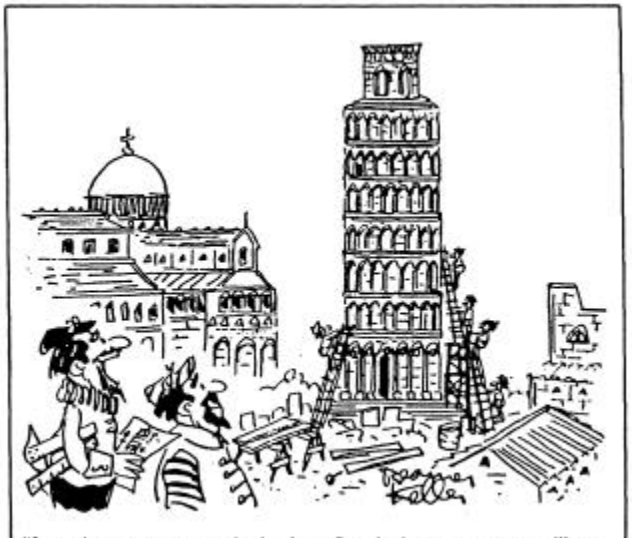

"I saved some money on the footings. But don't worry—no one will ever notice."

Reprinted with grateful appreciation to the artist, Reamer Keller